Massachusetts Bays National Estuary Program

Implementation Workplan
July 1, 2015 to June 30, 2016

Anticipated Outcomes and Action Areas

Under our draft CCMP, the following are anticipated outcomes for this fiscal year:

1. MassBays provides new resources for research and management in the Bays.
2. MassBays reaches all planning-area municipalities with actionable information about estuaries.
3. MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

These outcomes will place MassBays in an improved position to continue and augment our ongoing efforts to mitigate and halt chronic impacts on the region's estuarine habitats. To accomplish this, MassBays Central Staff and Regional Coordinators have agreed to take up specific tasks falling into six action areas:

1. Gathering data on conditions and trends (DATA)
2. Reducing stormwater discharge volumes and pollutant loadings (SW)
3. Reducing contamination from wastewater (WW)
4. Adapting to/mitigating impacts of climate change (CC)
5. Removing barriers to streamflow and tidal flushing (SF)
6. Managing invasive species (IS)
7. Conducting education and outreach (E&O)

In addition to the tasks under these action areas, MassBays has committed to carrying out the following overarching projects, which will serve as a framework for our work this year:

Cross-cutting Projects

Comprehensive Conservation and Management Plan (Ongoing)

Objective: Revise MassBays' CCMP

Description: MassBays' Executive Director will work closely with EPA Regional and Headquarters staff to ensure that the CCMP revision meets standards set out by pending guidance. This may require re-convening a Management Committee subcommittee and Local Governance Committees to ensure in turn that local priorities are still reflected in the final document.

Partners: MassBays Central Staff leads this effort. Partners include the Management Committee, and Regional Coordinators and Local Governance Committees.

Deliverables and Milestones: documents produced to date are included in our draft Revised CCMP, especially in the Appendices, available online (http://www.mass.gov/eea/docs/mbp/publications/massbays-public-review-draft-ccmp-4-15-15.pdf). The final deliverable will be a Revised CCMP submitted to EPA Headquarters for concurrence, to be provided by September 30, 2015, including the following attachments: draft Fiscal Plan, draft Communications Plan, and draft Monitoring Plan.

Long-term Outcomes: Clear direction for MassBays for the next 10 years; established niche for MassBays in the crowded Massachusetts political/organizational structure around coastal issues and initiatives.

Embayment assessment and restoration tool (New)
Objective: to develop a basis for setting restoration targets across the region.
Description: Building on the Estuary Delineation and Assessment and methods developed by EPA's Narragansett Lab with the Gulf of Maine Council (GOMC) and others, MassBays will identify parameters useful for cross-region comparison of embayments, and develop a tool for setting restoration targets that represent significant improvement in local conditions. The tool and its implications will be shared with local stakeholders, including municipal decisionmakers, as well as state agencies with responsibility for restoration. At the same time, the Cape Cod RC will continue to inventory and prioritize habitat restoration projects for implementation funding, providing an example prioritization scheme for the larger MassBays.

Partners: RCs, LGCs, Management Committee, Barnstable County Coastal Resources Commission, state and local agency representatives, EPA, GOMC, consultant

Deliverables and Milestones: Matrix of embayment types (December 2015), target restoration conditions by type (March 2015), presentations to state agencies and local stakeholders.

Long-term Outcomes: measurable improvement in individual embayments' condition.
CCMP Outcomes: MassBays provides new resources for research and management in the Bays; MassBays reaches all planning-area municipalities with actionable information about estuaries; MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Grant program re-launch (Ongoing)
Objective: Revise existing Research and Planning Grant Program to align with new CCMP goals and outcomes.
Description: With input from an external advisory committee, MassBays Staff Scientist will finalize revision of MassBays' grant program and produce a program fact sheet. MassBays staff will subsequently solicit grant applications via an RFR and convene a separate review committee to distribute awards.

Partners: Advisors from: Narragansett Bay NEP, Saugus River Watershed Association (past grantee), EPA Region 1, MIT Sea Grant, MA Department of Environmental Protection

Deliverables and Milestones: revised RFR and announcement by September 2015; list of successful applicants, project titles, and funding requests by December 2015.

Long-term Outcomes: progress on CCMP priorities and action plans

Gathering data on conditions and trends (DATA)

MassBays-wide monitoring program development (Ongoing)
Objective: Meet requirements of the 2012 MassBays Program Evaluation; provide consistent reporting regarding the state of the bays.
Description: MassBays will develop a bays-wide monitoring plan that links to both local and regional monitoring efforts. MassBays will continue to collaborate with the Northeast Sentinel Monitoring Program and will continue to assist in the development of the Northeast Sentinel Monitoring Plan as the document is finalized and prepared for publication and implementation, Northeast Coastal Acidification Network (MassBays is a partner in the regional effort to engage stakeholder in ocean acidification awareness), and Gulf of Maine NEPs to connect MassBays to the

larger region. As a demonstration for nested subregion-scale monitoring, the Lower North Shore RC will work with MassBays' staff scientist and local and subregional partners to identify data gaps, determine monitoring parameters, and develop a 5-year Marine Monitoring Plan.

Deliverables and Milestones: MassBays and Lower North Shore monitoring plan drafted for review by advisors (December 2015); 5-year monitoring plans for MassBays and Lower North Shore with associated cost estimates and funding plans (March 2016).

Long-term Outcomes: More-frequent, long-term water quality and fish tissue monitoring in MassBays, in the larger national and regional context.
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries; MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

National Coastal Condition Assessment 2015 (Ongoing)
Objective: Provide support to EPA Office of Research and Development by coordinating the 2015 National Coastal Condition Assessment for Massachusetts.
Description: Working closely with EPA, MassBays will oversee sampling collection at 52 stations in Massachusetts state waters for water quality, sediment, and fish tissue analysis by a consultant selected this past year. Data collected will not only be in line with and provide information for the NCCA program, but will also help frame monitoring efforts under our new CCMP.

Partners: Management Committee's Science and Technical Advisory Subcommittee, MA Division of Marine Fisheries, CR Environmental

Deliverables and Milestones: water, sediment, and fish tissue samples delivered to EPA for distribution to specific laboratories for analyses (June-September 2015)

Long-term Outcomes: continuous monitoring of coastal conditions to inform both national and regional management decisions.
CCMP Outcomes: MassBays provides *regular and locally informed State of the Bays reporting* that reflects the unique characteristics and progress toward targets for planning area embayments.

Target species and habitat monitoring and assessment (New and Ongoing)
Objective: support long-term monitoring of critical species and habitats in MassBays
Description: All RCs will take up sub-region-specific monitoring and assessment efforts to support CCMP goals and outcomes. Programs include:

- Upper North Shore RC will seek funding for a Marsh Edge Erosion Task Force project to assess impact of wave action, bioturbators, sea level rise, excessive nutrients, and vegetation on marsh sustainability.
- Metro Boston RC will assess and update the Boston Harbor Habitat Atlas and associated resources, including assessing the current online platform. (Ongoing)
- South Shore RC will share results of mapping (to be carried out by DMF with MassBays support) to assess eelgrass trends in Plymouth, Duxbury, and Kingston Bays from 1951 to present, using historical aerial photographs at a finer scale and use a consistent methodology over all time periods and start to elucidate potential causative factors for eelgrass losses noted in recent years. (New)
- South Shore RC will conduct horseshoe crab spawning surveys in Duxbury Bay in May and June and assist with tagging and re-locating horseshoe crabs. (Ongoing)
- South Shore RC will investigate potential for restoring mussel habitat, including a joint project

with MassAudubon South Shore to assess the role of mussel spat as a food source for migratory red knots and conduct an initial analysis of soft-shell clam population structure in Scituate and Marshfield. (New)

Partners: municipal staff, DMF, CZM, MassAudubon, Division of Marine Fisheries, Mass. Coastal Zone Management

Deliverables and Milestones: horseshoe crab spawning survey data, including trends (Fall 2015), map and summary of mussel project, cohort analysis of soft-shell clams (both Winter 2016)

Long-term Outcomes: Improved habitat value and species conditions
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries; MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Inventory and Support Citizen Monitoring in Massachusetts Bay and Cape Cod Bay (New)
Objective: Assess the state of citizen monitoring within the region
Description: Multiple organizations across the Bays are conducting monitoring of local resources, but the results and data are, in many cases, hidden away in filing cabinets. MassBays will lead an effort to inventory ongoing long-term monitoring, university-based data sets, and emerging efforts to document environmental conditions across the region. The results will inform action to improve citizen monitoring practices through training and other outreach, bring the information to researchers and interpret outcomes for decisionmakers, and inform future State of the Bays assessments.

Partners: NERACOOS, GOMC's Ecosystem Indicator Partnership, RSPs, Management Committee, watershed and community-based associations, research/academic institutions, state/municipal entities, schools/clubs

Deliverables and Milestones: Online inventory/map of citizen monitoring programs, layered with data gaps and sentinel monitoring needs identified by the NE Sentinel Monitoring Program.

Long-Term Outcomes: New structure and supports for citizen monitoring efforts, increase in valid data applicable to resource management questions.
CCMP Outcome: MassBays provides *new resources for research and management* in the Bays.

Publish salt marsh monitoring data for restored marshes (New)
Objective: Make salt marsh monitoring data accessible
Description: Between 2003 and 2014 APCC Wetland Biologist Tara Nye monitored more than 15 salt marshes to compare pre-restoration and post-restoration conditions. Reports were provided to state agencies but are not readily accessible otherwise. This information will be made available to resource managers, particularly as climate change and sea level rise may affect coastal wetlands. A short report would also help to build public support for protecting and restoring salt marshes. The Cape Cod RC will develop a short outreach report summarizing salt marsh monitoring data.

Partners: DER

Deliverables and Milestones: Draft outline with sample plots and graphics to inform Year 2 of the 2-year project (Spring 2016)

Long-term Outcomes: Better-informed restoration projects
CCMP Outcomes: MassBays provides new resources for research and management in the Bays; MassBays reaches all planning-area municipalities with actionable information about estuaries.

Reducing stormwater discharge volumes and pollutant loadings (SW)

Stormwater management technical support, education, and outreach (New and Ongoing)

Objective: Provide technical support and outreach materials and services to municipalities to improve stormwater quality and reduce quantity.

Description: All RCs will promote stormwater best management practices, especially green infrastructure alternatives based on the Handbook completed last year. RCs will continue their support of newly formed Cape Cod Stormwater Managers Group and Upper North Shore Merrimack Valley Stormwater Management Collaborative to assist stormwater managers. Other specific tasks include:

- To reduce impacts of stormwater from the Route 3 corridor the South Shore RC will work with the South Shore communities along Route 3 and partner with Mass. Department of Transportation to assess and prioritize stormwater improvements that impact the North River, South River, Jones River, Town Brook, and Eel River. (New)
- Upper and Lower North Shore RCs will provide outreach and support re: Massachusetts MS4 permit through workshops, presentations, or personal discussions, mapping, and provision of public education materials through the Greenscapes program and CZM's Stormwater Solutions program, including infiltration, LID, and environmentally friendly landscaping. (New and Ongoing)
- Lower North Shore and Cape Cod RCs will identify and take advantage of opportunities to promote and implement Low Impact Development (LID) in subregion communities. (New and Ongoing)

Partners: Metropolitan Area Planning Council, Great Marsh and Cape Ann estuary and watershed communities, private contractors, and the Eight Towns and the Great Marsh Committee, 20 North Shore communities, SWIM, Ipswich River Watershed, Pioneer Valley Planning Commission

Deliverables and Milestones: training workshops, education and outreach products that can be used MassBays region-wide (ongoing); deliverables under state-funded grants to municipalities (proposals pending)

Long-term Outcomes: Stormwater management helps to improve water quality that supports healthy coastal ecosystems and sustainable human uses.

CCMP Outcomes: MassBays reaches all planning-area municipalities with *actionable information about estuaries*.

Adopt a Beach Program (Ongoing)

Objective: To restore shoreline habitats

Description: Lower North Shore RC will train volunteer beachkeepers to remove marine debris and monitor their adopted area for resource degradation. Adopted areas include beaches, islands and river banks.

Partners: 400 trained beachkeepers, local DPWs and Park & Rec, SWIM

Deliverables and Milestones: List of training sessions and clean up events, map of beaches, islands and river bank adopted.

Long-term Outcomes: Increased stewardship of our natural resources including public awareness of the impacts of human behaviors on shoreline habitats, such as stormwater, marine debris, invasive species.

CCMP Outcomes: MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Plankton and nutrient study; water temperature study (New and Ongoing)
Objective: assess conditions and determine trends in Salem Harbor water quality
Description: Past work indicates that plankton are a major source of the turbidity in Salem Harbor. Little is known about this. Lower North Shore RC will work with Salem State University to develop a new study to explore the nature of the plankton and nutrients in the harbor. Nutrient sampling will continue. Following the closure of Salem Harbor Power Station on May 31, 2014, Lower North Shore RC will continue to monitor water temperature to document changes within the harbor when seawater is no longer being extracted and returned at a higher temperature.

Partners: Brewers Hawthorne Cove Marina, SSU, Sea Shuttle Inc.
Deliverables and Milestones: Public meeting, data trends and conditions assessment.

Long-term Outcomes: Improved water quality in Salem Harbor
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries; MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Temporal and spatial expansion of open shellfish beds (Ongoing)
Objective: prioritize and streamline water testing for shellfish bed categorization
Description: South Shore RC will work with partner communities to pursue stormwater and wastewater improvements in locations that impact shellfish beds, and with DMF to generate an approved priority list for sub-regional shellfish beds.

Partners: Towns of Scituate, Marshfield, Duxbury, Kingston, and Plymouth; Mass. Division of Marine Fisheries.

Deliverables and Milestones: Shellfish bed meetings (December 2015), DMF-approved priority list for South Shore shellfish beds (June 2016)

Long-term Outcomes: Increased acreage and duration of open shellfish beds on the South Shore
CCMP Outcomes: MassBays provides new resources for research and management in the Bays; MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Reducing contamination from wastewater (WW)

Promote science-based wastewater management on Cape Cod (Ongoing)
Objective: Support multiple efforts to establish sustainable wastewater management on the Cape.
Description: Cape Cod RC will work with partners to promote regional, science-based wastewater management through a variety of means: a) Continuing to host the Environmental Summit on Wastewater (a group of 35 NGOs convened in 2012 to build consensus on wastewater management), b) Continuing to serve on the Cape Cod Commission's 208 Monitoring Subcommittee that provides recommendations for monitoring wastewater management alternatives, c) Providing outreach videos and other materials at workshops and meetings, and d) Providing other technical assistance as needed.

Partners: APCC, 35 Cape Cod-based nonprofits, Cape Cod Commission, EPA

Deliverables and Milestones: Education and outreach materials, recommendations for monitoring

Long-term Outcomes: Improved near-shore water quality
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries.

Clean Beaches & Streams Program (New and Ongoing)
Objective: To reduce bacterial contamination in Category 4 and 5 303d-listed waters
Description: Lower North Shore RC will identify bacterial pollution with biweekly summer water testing for Enterococcus at outfalls and streams throughout the Lower North Shore and notify the appropriate authorities of the results. Additional streams will be tested using the EPA Stormwater Equipment Toolbox to detect human wastewater.

Partners: Clean Beaches & Streams Network, volunteers

Deliverables and Milestones: Bacterial levels for 14 - 22 outfalls or streams and results from stream assessments, list of bacterial hot spots, and case study of at least one remediation effort by a municipality (October 2015)

Long-term Outcomes: Improved conditions to support habitat restoration
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries; MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Removing barriers to streamflow and tidal flushing (SF)

Streamflow restoration (Ongoing)
Objective: inform and support municipalities in their efforts to maintain appropriate streamflow in the midst of competing demands
Description: South Shore RC will work with the Towns of Scituate (First Herring Brook) and Norwell and Hanover (Third Herring Brook) to maintain ecologically appropriate flows within the context of municipal water demand and implement the results of the towns' previous state-funded sustainable water management initiative grants.

Partners: Towns of Scituate, Norwell, Hanover; Mass. Division of Ecological Restoration; Mass. Department of Environmental Protection

Deliverables and Milestones: Implementation of a streamflow improvement measure (June, 2016)

Long-term Outcomes: Improved streamflow in local rivers and streams
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries.

Dam removals (New and Ongoing)
Objective: improve stream continuity and fish passage
Description: South Shore RC will work with multiple communities and partners to assess feasibility of and seek funding for removal of dams and other barriers and collect ecological data pre- and post-restoration. Projects will include Mill Pond Dam (post-restoration) and Tack Factory Dam (pre-restoration) on Third Herring Brook (Norwell/Hanover), multiple structures on the South River (Marshfield/Duxbury, pre-restoration), Hunters Pond Dam on Bound Brook (Scituate/Cohasset, pre-restoration), Elm Street Dam (pre-restoration) on the Jones River (Kingston), multiple structures on

Town Brook (Plymouth, pre- and post-restoration), and Tidmarsh Farms/Fresh Pond (pre- and post-restoration) on Beaver Dam Brook (Plymouth).

Partners: Towns of Norwell, Hanover, Marshfield, Duxbury, Scituate, Cohasset, and Plymouth; Mass. Division of Ecological Restoration; Mass. Division of Marine Fisheries; NOAA Restoration
Deliverables and Milestones: Grant proposal to advance dam removal at one of the proposed sites (February 2016), summary report on dam removal efforts and progress (June 2016)

Long-term Outcomes: Increased access to stream-miles for fish and other wildlife
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries.

Fish run monitoring (Ongoing)
Objective: build on existing volunteer herring monitoring program and maintain a reliable database regarding herring migration
Description: South Shore and Cape Cod RCs will recruit, train, organize, and support partners and volunteers to count river herring during upstream spring migration. RCs will collect and maintain data from water level and temperature data loggers in anadromous fish streams in the regions and continue to participate in the Herring Warden Network to improve and implement best management practices relevant to conducting herring counts and managing fish ladders.

Partners: DMF, municipal staff, River Herring Warden Network, NOAA National Marine Fisheries Service, local nonprofits, citizen-volunteers

Deliverables and Milestones: Draft 2015 herring run data report (Fall 2015), training sessions for volunteers (Spring 2016), final data report Spring 2016; workshop or other presentation (Spring 2016), outreach materials.

Long-term Outcomes: Well-informed resource management decisions
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries; MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Adapting to/mitigating impacts of climate change (CC)

Climate Change Resilience in the Great Marsh (New)
Objective: Ensure on-time and on-budget deliverables under a Hurricane Sandy/National Fish and Wildlife Foundation (NFWF) grant
Description: With support from the Upper North Shore RC, the Great Marsh Resiliency Team received $2.9M NFWF funding to implement a suite of projects that should simultaneously reduce risk to coastal communities while increasing the resiliency of those ecological systems that those communities are dependent upon.

Partners: National Wildlife Federation, Parker River National Wildlife Refuge, Boston University, MassAudubon, Ipswich River Watershed Association, Woods Hole Group, University of New Hampshire/Jackson Laboratory, Marine Biological Lab, Center for Coastal Studies, all the Great Marsh communities

Deliverables and Milestones: Grant spans 3 years. This year's deliverables include: Phragmites and Pepperweed Control and Eelgrass Restoration, securing Student Conservation Association Researchers, hydrodynamic modeling data collection and modeling, gage installation and

maintenance, community SLR planning, Great Marsh Revitalization Task Force meetings and communication.

Long-term Outcomes: Reduced risk from climate change impacts to coastal communities and increased resiliency of ecological systems
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries

Impacts of sea level rise on water resources and infrastructure (Ongoing)
Objective: model and evaluate the potential effects of rising sea level on the mid-Cape's groundwater system
Description: Cape Cod RC will work with the USGS and partners in this 3-year project, and translate outcomes into public outreach materials, policies and adaptation measures. Potential effects include changes in stream baseflow, depth to groundwater, and changes in the subsurface saltwater-freshwater interface, which could impact infrastructure, wastewater management, water, wetlands, ecosystems, planning, and land use.

Partners: USGS, Cape Cod Commission, The Nature Conservancy, CRC.

Deliverables and Milestones: Results of modeling study summer 2015; literature review of adaptation measures, recommendations for adaptation measures, two workshops dates TBD.

Long-term Outcomes: Municipal and Cape-wide plans to respond to leas level rise
CCMP Outcomes: MassBays provides new resources for research and management in the Bays.

***Municipal Coastal Resiliency/Living Shorelines* (New)**
Objective: Assist municipalities in implementing coastal resiliency and living shoreline initiatives
Description: RCs will contribute to newly funded initiatives in the sub-region, including:

- Working under contract with the City of Salem, identify shoreline sites that will benefit from green infrastructure, engage the public through a forum and volunteer participation in the shoreline survey in order to communicate to residents the community-level adverse impacts and vulnerability of natural systems to climate change.
- Serve on the Manchester Coastal Resiliency Advisory Group to implement a state coastal resiliency grant, providing technical assistance, data collection and outreach support.
- Assist the Town of Truro to address coastal erosion and flooding by undertaking a tidal restoration project in the Upper Pamet River valley.
- Monitor coastal erosion and the role of natural communities in Brewster
- Assist Cape Cod Coastal Resources Commission to develop recommendations for County Commissioners for improving coastal resiliency.

Partners: City of Salem Planning Department and Chester Engineering, CZM Salem residents, Manchester-by-the-Sea staff and residents, Tighe & Bond, MCST, Barnstable County CRC members, Towns of Truro and Brewster

Deliverables and Milestones: Living Shoreline survey, public forum on coastal green infrastructure as a climate adaptation strategy, report on green infrastructure feasibility at the three sites selected, case study on lessons learned; schedule as laid out in grantee contracts

Long-term Outcomes: Local stakeholders will be engaged in efforts to expand living shorelines for habitat protection and storm/sea level rise impact mitigation.
CCMP Outcomes: MassBays provides new resources for research and management in the Bays; MassBays reaches all planning-area municipalities with actionable information about estuaries.

Salt Marsh Monitoring for Climate Change Impacts (Ongoing)
Objective: establish and implement monitoring protocols suitable for volunteers
Description: Upper North Shore RSP and Lower North Shore RSP will monitor salt marshes in Plum Island Sound/Great Marsh, Good Harbor Marsh (Gloucester), Juniper Cove (Salem) and Old Creek Marsh (Salem) with help from citizen volunteers; South Shore RC will establish multiple permanent transects along the North River for long-term monitoring of vegetation change, including conversion of high marsh to low marsh and brackish marsh to salt marsh.

Partners: North River communities, Friends of Good Harbor, Waquoit Bay National Estuarine Research Reserve, CZM, UNH, LTER, RSPs, Salem State University, Boston University

Deliverables and Milestones: Citizen science protocols to monitor long-term climate change impacts on salt marshes from sea level rise, documentation of monitoring efforts (December 2015), map and photos of established transects on the North River (June 2016).

Long-term Impacts: Increased understanding of salt marsh response to sea level rise; increased capacity among citizen volunteers.
CCMP Outcomes: MassBays provides new resources for research and management in the Bays; MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Tide gate inventory (Ongoing)
Objective: Improve salt marsh conditions up- and down-stream of poorly managed, mismanaged, and abandoned tide gates.

Description: Document all tide gates in Massachusetts Bay and Cape Cod Bay, develop and test a field-based assessment protocol supported by capacity for remote data entry, and establish a web-based monitoring and management tool that incorporates potential impacts of sea level rise.
Partners: MassBays and CZM; RSPs; Advisory group includes representatives from MA Division of Ecological Restoration, MA Department of Environmental Protection, USGS, EPA Region 1.

Deliverables and Milestones: List of advisors, contractor scope of work, database, and protocol to produce a map/inventory of tide gates have been delivered on time and within budget under NOAA grant. Remaining deliverables include: field training for MassBays, CZM, DER, and DEP staff; web-based map and reporting application; tide gate layer updated on the state coastal GIS tool; outreach materials for municipal managers; and program evaluation. The grant funds expire March, 2016.

Long-term Outcomes: Increase in active, informed tide gate management that takes into account surrounding natural resources, abutting development, and rising sea levels.
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries.

Assessment of historic eelgrass extent, Blue Carbon, Green Eelgrass (Ongoing)
Objectives: Provide a reliable basis for statements about eelgrass habitat extent and loss; expand regional planning regarding Blue Carbon to include eelgrass restoration and protection, by documenting eelgrass carbon sequestration, educating decisionmakers, and prompting new investments in eelgrass protection.
Description: This Climate Ready Estuaries project brings together regional experts in eelgrass characterization, restoration, and protection to build a case for eelgrass as an important component of Blue Carbon efforts in Massachusetts. The project includes a literature review, *in-situ* carbon sequestration measures to fill in data gaps, using sea level rise predictions to estimate eelgrass meadow changes, and developing written education tools and hosting workshops and meetings to influence local and state-level decisionmaking. To assess the reliability of historic eelgrass maps

(prepared by MA DEP staff beginning in 1951), we will support intensive ground-truthing of eelgrass presence/absence in Duxbury, Kingston, and Plymouth Bays.

Partners (roles): MassBays NEP (project management, education & outreach), MIT Sea Grant (field investigations, education & outreach), EPA Region 1 (field investigations, estimating potential for eelgrass restoration and loss), Massachusetts Office of Coastal Zone Management (CZM; localized sea level rise modeling, GIS mapping), Massachusetts Division of Marine Fisheries (DMF; field investigations, historic map ground-truthing), and Boston University (sample analysis). A graduate-level intern and professional facilitation and communications services will be secured via competitive solicitations.

Deliverables and Milestones: Updated and uniform maps of eelgrass beds in Duxbury, Kingston, and Plymouth Bays (Fall 2016) Literature review re: carbon sequestration rates in eelgrass (summer 2015); field studies (summer 2015) and sample analysis (fall 2015) for four eelgrass beds in Massachusetts Bay and Cape Cod Bay and a comparison site in Martha's Vineyard; estimates of potential eelgrass loss and upslope migration due to sea level rise (fall 2015); regional scientific workshop to share results of the literature review and field studies, and solicit advice re: cogent points to share with resource managers (winter 2016); communication and outreach materials, including professionally developed scientific posters and fact sheets, slide presentations and speaking points to be used by MassBays staff and partners, and standing banners describing the ecosystem values of eelgrass (winter 2016); three regional workshops for resource managers and local partners (spring 2016).

Long-term Outcomes: mutual understanding among researchers and resource managers regarding the importance of including eelgrass in Massachusetts blue carbon programming; increased and new investment in eelgrass restoration and protection.
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries.

Managing invasive species (IS)

Invasive species treatment and control
Objective: To control emergent and existing *Phragmites* stands, control invasive pepperweed and purple loosestrife, and devise controls for green crabs
Description: Several of the RCs will continue efforts to control and eradicate invasive species that reduce ecosystem value of habitats:

- Upper North Shore RC will treat Phragmites in the Great Marsh, and post-treatment monitoring to determine impact of previous treatment efforts, obtaining permits, and perform small scale treatment for an estimated 15 acres of Phragmites (New and Ongoing)
- Lower North Shore RC will lead pepperweed education and removal efforts to limit its spread as part of a New England-wide community-based mapping and control effort. Upper North Shore RC will also continue the in-the-field monitoring of pepperweed in estuarine areas that have not yet been evaluated and complete finer mapping of non-accessed, known sites. Activities will also consist of pepperweed pulling and chemical treatment. (Ongoing)
- Upper North and South Shore RCs will participate in a New England-wide effort to standardize green crab monitoring protocols, including testing burrow count and crab trapping protocols. (New on the South Shore; Ongoing on the Upper North Shore)
- South Shore RC will implement an effort to control purple loosestrife at the site of the recently removed Mill Pond Dam with *Galerucella* beetles. (Ongoing)

Partners: Mass Audubon, Parker National Wildlife Refuge, MA-NH- ME Invasive Group, SWIM, Saugus River Watershed Association
Deliverables and Milestones: Documentation of volunteer efforts, mapping of known and treated sites; report on purple loosestrife treatment.

Long-term Outcomes: Improved habitat value
CCMP Outcomes: MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Invasive Species Monitoring (Ongoing)
Objective: maintain state-wide database of introduced species
Description: Working with citizen monitoring groups, Upper and Lower North Shore RCs monitor multiple established field sites for non-native species. Data are provided to CZM program for inclusion in online coastal maps.

Partners: CZM, MIT Sea Grant, volunteers

Deliverables and Milestones: Photo documentation of monitoring (Fall 2015); data submitted to CZM MIMIC coordinator (December 2015)

Long-term Outcomes: Increased understanding of the transport, population dynamics, and impacts of invasive species, early detection of newly arriving invasive species.
CCMP Outcomes: MassBays provides regular and locally informed State of the Bays reporting that reflects the unique characteristics and progress toward targets for planning area embayments.

Conducting education and outreach (E&O)

Communications and Outreach Planning and Implementation
Objective: respond to Program Evaluation, increase awareness of MassBays natural, educational, and information resources.
Description: While MassBays Central Staff develops a region-wide Communications Plan for MassBays, RCs will provide the following opportunities for local citizens to hear about the importance of natural resource protection and restoration:

- Underwater in Salem Sound Lecture Series
- Great Marsh Sea Level Rise Adaptation Workshop
- Climate Change outreach, including a template presentation that can be shared across the region.
- Salem Sound to Nahant Climate Change Resiliency Symposium
- Metro Boston outreach initiative, to share information about the Boston Harbor Habitat Atlas, online resources available from MassBays and others, opportunities for collaboration, and funding opportunities.

Deliverables and Milestones: This effort will be ongoing throughout the year; deliverables will include reports from individual and group meetings, lecture program listings, conference agendas, printed and online materials.

Long-term Outcomes: Informed local response to climate change impacts
CCMP Outcomes: MassBays reaches all planning-area municipalities with actionable information about estuaries.

Region-wide and subregion-specific outreach and communications
Objective: provide access to MassBays initiatives and materials for Management Committee and Local Governance Committees.
Description: Engage Management Committee in MassBays projects via partnerships, networking, and information-sharing. All RCs will feature MassBays' support and projects in multiple outreach platforms, including presentations at local events, RSP publications and website, and social media where applicable.